October 3, 1996

To: Interested Parties

Release of MVEI7G

The purpose of this letter is to announce the release of the Air Resources Board's (ARB) Motor Vehicle Emission Inventory (MVEI) Model, version 7G1.0. The model is used to estimate emissions from all on-road motor vehicles in California. This version represents an update to the previous version, MVEI7F1.1. The model is available on the Internet and on computer diskettes at the addresses noted below.

Prior to the release of this version of the model, two public workshops were conducted. On January 27, 1994, ARB's staff held a workshop to discuss changes that were being considered and sought input from the public. On December 15, 1995, the staff held a workshop to discuss a draft of MVEI7G. During that workshop and the public comment period that followed, we received many comments and suggestions that led to a number of changes and additional improvements to the model.

This updated version of the model incorporates new data, methods, and regulations adopted since the release of MVEI7F1.1 in September 1993. As a result, emission estimates have improved significantly as summarized in the attached document. The draft documentation of the model that was available at the workshop is being updated to reflect the latest changes, and it is expected to be available in about two months. It will be made available on the Internet and in hard copy form. In the interim, the draft documentation continues to be available on the Internet.

Later this year, ARB expects to release an updated version of BURDEN (the vehicle activity module of MVEI), to incorporate new vehicle activity information now being prepared by the metropolitan planning organizations (MPOs) within California. This update will affect only the BURDEN module and will not change the EMFAC/WEIGHT modules of MVEI.

To avoid disruption of transportation conformity findings under the Clean Air Act, ARB will request from U.S. EPA, a two-year, phase-in period of MVEI7G when the new model is submitted to that agency in February 1997. During the phase-in or grace period, MPOs will be able to use either MVEI7G or EMFAC7F in conformity assessments. This will enable the same emission factors used in each area's SIP to also be employed in MPO emissions analyses. There is additional discussion of this issue in the attachment to this letter.

Users of MVEI7G are cautioned regarding the use of emission factor models in microscale dispersion analyses of transportation projects. Factors within this model that are appropriate for use in calculation of regional mobile source emission inventories may not be appropriate for use in specific transportation project assessments at the link or intersection level. Application of MVEI7G emission factors to currently available dispersion models (e.g., CALINE4, CAL3QHC) may result in overestimation of pollutant concentrations. Therefore, choice of the appropriate emission factors for use in transportation project analyses should be made in consultation with the California Department of Transportation, Office of Environmental Engineering and other interested parties.

Users will find this model easier and faster to use than previous versions. Although more complex internally, the model contains more features and has been streamlined to run considerably faster than before. A user-friendly interface simplifies the selection of input variables and makes it easier to use for first time users.

The model can be obtained at the following addresses:

World Wide Web:

www.arb.ca.gov/html/mvei.html

3.5" diskettes:

California Air Resources Board
Technical Support Division
Attn: Lynne Greenwood
P.O. Box 2815
Sacramento, CA 95812
(916) 322-6049

For questions regarding the operation of the model, contact Nat Kong, at (916) 324-7163. For questions regarding transportation conformity issues, contact Doug Thompson, Associate Transportation Planner, at (916) 322-7062. For general questions regarding the motor vehicle emission inventory, contact Mark Carlock, Chief of the Motor Vehicle Analysis Branch, at (818) 575-6608.

Sincerely,

Terry McGuire, Chief
Technical Support Division

Attachment

ATTACHMENT

Release of MVEI7G Model DATE: 10/3/96

The Air Resources Board (ARB) is responsible for estimating emissions from all on-road motor vehicles operating within the State. These estimates are made using the computer model referred to as the Motor Vehicle Emission Inventory Model, or MVEI for short. The current version of this model, MVEI7F1.1, was released in September 1993. A new version, MVEI7G, is now available. MVEI7G incorporates new data and methods and reflects regulations and legislation that have been adopted since the release of MVEI7F1.1. MVEI7G results in significantly improved emission estimates than MVEI7F1.1.

This document summarizes the changes reflected in MVEI7G1.0 and the resulting impacts on emissions. A more complete discussion, as well as a description of how the model works, can be found in the documentation which will be available in about two months.

Summary of changes that affect emissions

Many changes and improvements that affect emissions have been added to the model. The most significant are the following:

- Redefine starts (change from origin-destination trips to number of engine start-ups);
- Redistribute starts by vehicle age (increase frequency of starts for older vehicles relative to newer vehicles);
- Modify the methodology for estimating start emissions to account for variable soak times rather than just cold and hot starts and to reflect a different test cycle;
- Adjust for high emitting vehicles (high emitter correction factor);
- Adjust for more real world driving patterns by accounting for off-cycle emissions and updating data pertaining to VMT by speed distribution (cycle correction factor);

- Incorporate new regulations and legislation:
  - 4 gm/bhp-hr NOx standard for heavy-duty trucks & buses
  - Benefits from enhanced I/M and improved basic I/M
  - SIP measure M3: Accelerated ULEV program for medium-duty trucks
  - SIP measure M8: 2.5 gm/bhp-hr NMHC+NOx standard for heavy-duty gas trucks;
- Incorporate new particulate matter emission factors (based on factors from EPA's PART5 Model);
- Revise VMT splits by weight class for heavy-duty trucks;
- Add I/M benefits for evaporative emissions;
- Update total vehicle population and VMT data;
- Revise activity splits and model year distributions for autos, light-duty trucks and medium-duty trucks (including population, VMT, and number of starts);
- Revise benefits for clean diesel fuels; and
- Revise emission factors for heavy-duty trucks.

Impact of changes on emissions

Table 1 summarizes the differences between 7F v1.1 and 7G v1.0 for the South Coast Air Basin (SoCAB) for calendar years 1990, 2000, and 2010. These differences result from either improved estimation methodologies, additional data, or the implementation of new control measures. Because 7G reflects the impacts of measures not available when 7F was completed, 7F and 7G are not directly comparable. If these measures were included in 7F, ROG and NOx emissions would drop about 50 and 100 tons-per-day in 2010, respectively. CO changes would be minimal.

As shown in Table 1, ROG and NOx emission estimates have increased for calendar year 1990 in 7G. By 2010, both ROG and NOx show a decrease from 7F. CO increases in all years, while PM decreases in all years. The text that follows Table 1 explains, by pollutant, the causes which are primarily responsible for the differences in emission estimates between the two models.

Table 1
South Coast Air Basin Emission Estimates (tons per day)

ALL MOTOR VEHICLES

Pollutant	**Calendar Year**	**7F** Emissions	**7G** Emissions	**% Change**
ROG	1990	700	749	7%
	2000	344	318	-8%
	2010	197	143	-27%
NOx	1990	745	929	25%
	2000	548	570	4%
	2010	525	398	-24%
CO	1990	6138	8169	33%
	2000	3023	3677	22%
	2010	1811	2028	12%
PM10	1990	70	40	-43%
	2000	62	20	-68%
	2010	69	16	-77%

NOTE: 1. All emissions are from the summer planning inventory except CO which is from the winter planning inventory.

2. 7G reflects the impacts of measures not available when 7F was completed; therefore, **7F and 7G are not directly comparable**. If these measures were included in 7F, ROG and NOx emissions would drop about 50 and 100 tons-per-day in 2010, respectively.

ROG: The estimate of ROG emissions from motor vehicles in the SoCAB has increased 7% for calendar year 1990. The increase in emissions for 1990 is primarily the result of the new high emitter and cycle correction factors affecting light- and medium-duty vehicles. New evaporative emission benefits for I/M and new vmt-by-speed distributions, as well as other minor revisions, partially mitigate the increases mentioned above. While all of these factors also affect ROG estimates in calendar years 2000

and 2010, there are additional changes which further decrease these emission estimates, resulting in 8% and 27% decreases in emissions for 2000 and 2010, respectively. These additional changes are regulations and legislation that were adopted after the release of 7F, and, therefore, were not included in 7F. These include revised emission factors for heavy-duty diesel trucks (due in part to technology used to meet PM standards) and the new enhanced inspection and maintenance program (specifically the evaporative emission benefits).

NOx: Estimates of NOx emissions from motor vehicles have increased 25% and 4% for calendar years 1990 and 2000, respectively. The new high emitter and cycle correction factors (applied only to light- and medium-duty vehicles) are almost solely responsible for the increases in 1990 and 2000. Revised clean diesel benefits, the new enhanced I/M program, and the effects of new NOx standards for heavy-duty trucks partially offset the increases in 2000. In 2010, the cycle correction factor also increases NOx emissions, but there are changes in heavy-duty truck estimates which offset these increases. The changes in heavy-duty truck emission estimates are largely due to regulations and legislation adopted between the release of 7F and 7G. They are, therefore, included in 7G, but not 7F. These control measures include the California and Federal 4 gm/bhp NOx standards and SIP measures M3 and M8. Revised estimates of the benefits of clean diesel also contribute to the decrease in NOx for 2010 when comparing 7F to 7G.

CO: Estimates of CO emissions from motor vehicles have increased by 33%, 22%, and 12% for calendar years 1990, 2000, and 2010, respectively. These increases are primarily caused by the new high emitter and cycle correction factors and by changes in the treatment of starts. In later years, the revised population splits between light- and medium-duty vehicles also cause an increase in CO emission estimates.

PM10: Estimates of PM10 emissions from motor vehicles have decreased 43%, 68%, and 77% for calendar years 1990, 2000, and 2010, respectively. The overwhelming majority of this decrease is the result of revised emission factors. The revised emission factors are based on U.S. EPA's PART5 Model which contains substantially smaller emission factors, particularly for tire wear.

Summary of changes that affect the operation of the model

In addition to changes that affect the emissions, we have made many changes that affect the speed, looks and convenience of running the model. Included in these improvements are additional user options that were not available in previous versions.

Work is currently underway to further expand the user capabilities and the ability to run different scenarios; these will be released as part of future updates. Some of the new features of the current model are described below:

- Menu-driven user interface;
- Streamlined to run faster (5 times faster than 7F);
- Choice of standard printed output or electronic output for use in computer spreadsheet or data base;
- Ability to run in batch mode (i.e., multiple calendar years without continuous input); and
- Ability to obtain emissions by model year as well as by fleet composite of all model years.

U.S. EPA Approval of MVEI7G and Grace Period for Conformity Purposes

U.S. EPA has the authority to approve emissions factors for use in transportation conformity emissions assessments. Currently EMFAC7F1.1 emissions factors are approved for use in these analyses. EMFAC7F1.1 emissions factors were also used to develop current SIP emissions budgets.

For conformity purposes, ARB plans to submit MVEI7G to U.S. EPA concurrently with submittal of the 1997 South Coast Air Quality Management Plan (AQMP) revision and the San Joaquin Valley PM10 Attainment Demonstration Plan. At that time -- about February 1997 -- we will request (a) U.S. EPA approval of MVEI7G for use in conformity assessments, and (b) a 24-month grace period before use of these new emissions factors would be required. This will allow a phase-in of new emissions factors for transportation conformity subsequent to their use in the SIP, thereby avoiding disruptions of conformity due to inconsistent emission factors.

ARB has discussed the 24-month grace period with staff at U.S. EPA Region IX, and has received support for the phase-in approach. A grace period of up to 24 months is consistent with Section 93.111(b)(1) of the federal transportation conformity regulation. Under the regulation U.S. EPA will also consult with the U.S. Department of Transportation on the length of the grace period, which will begin at the time U.S. EPA approves MVEI7G for conformity purposes and announces availability in the *Federal Register.*